

**Engineers Australia  
Engineering Heritage Victoria**

Nomination for Recognition  
Engineering Heritage Australia Recognition Program

**No 21 Dredger, Morwell**



**September 2016**

**REVISION/CHECKING HISTORY:**

REVISION NUMBER	DATE	CHECKED BY		ISSUED BY	
0	22 September 2016				
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**THIS NOMINATION COMPILED BY:**

**Ian Newnham**

**Secretary**

**Friends of No.21 Dredger**

**On behalf of the Gippsland Regional Group, Engineers Australia**

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## 1 INTRODUCTION

No 21 Dredger is historically significant as it was the first bucket wheel excavator to be used at the Morwell open cut. The Morwell open cut was a new major open cut project developed by the SECV with work starting on site in 1949. No 21 Dredger had a long period of service in the mine and worked between October 1955 and August 1992. It was used to excavate overburden and to supply brown coal to the Yallourn power station, and later to the Morwell power station and briquette factory, and Hazelwood Power Station.

No 21 Dredger is technically significant as an example of the earliest design of Bucket Wheel Excavators used in the Latrobe Valley. It is representative of the first generation of German built Bucket Wheel Excavators used by the SECV, the design of which originated in German brown coal mines in the mid-1930's. No 21 Dredger was one of the earliest uses of German continuous mining techniques and technology to be applied outside of Germany.

No 21 Dredger is a rare surviving example of the earliest pre-war design of Bucket Wheel Excavator used by the SECV for brown coal mining. The Dredger has very high interpretive potential, and its current location at the PowerWorks Visitors Centre allows close inspection and easy viewing access by visitors. It is the oldest surviving Bucket Wheel Excavator in the Latrobe Valley and the only machine of this type on display in Australia.



**Figure 1.** No.21 dredger on display at PowerWorks Visitors Centre, Morwell

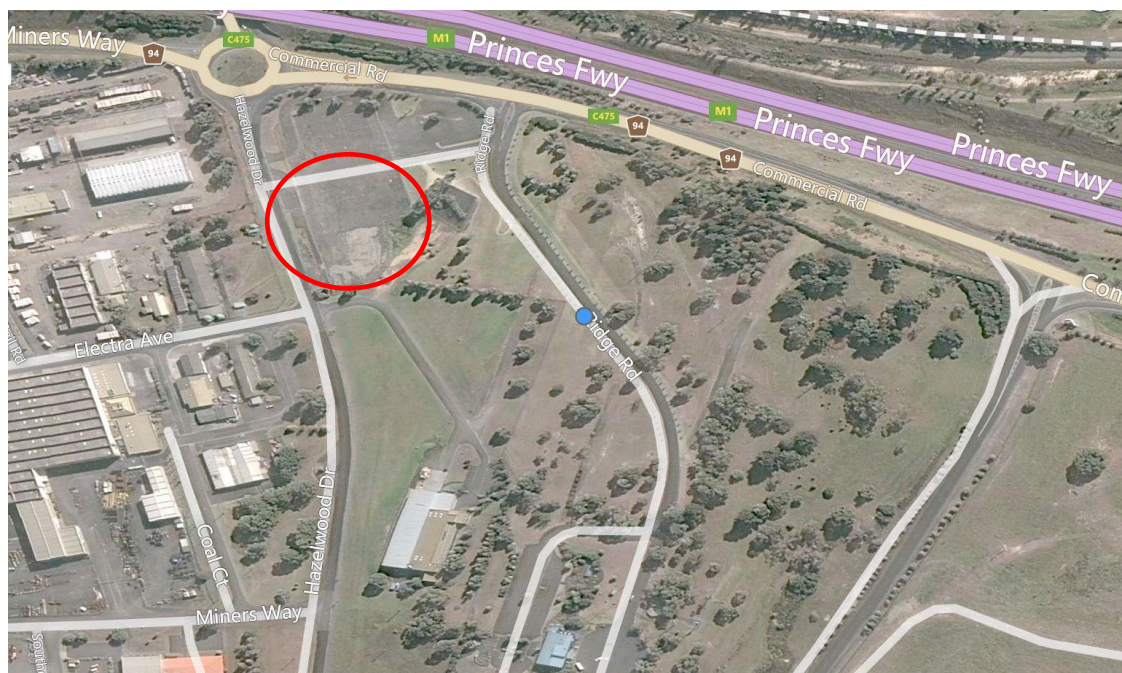


## 2 LOCATION

No 21 Dredger is now located on the PowerWorks precinct at “The Ridge” Morwell.

Dredger 21 was gifted in April 2010 to Gippsland International, a not-for profit organisation originally formed to promote Gippsland Engineering. In August 2010 it was listed on the Victorian Heritage Register. It is an icon for the Latrobe Valley Region and representative of the community and the major industry on which it was based.

It is now managed by the “Friends of Dredger 21”, a volunteer group from within Gippsland International.



**Figure 2.** No.21 dredger location at Morwell

### 3 HISTORY

#### 3.1 Other/Former Names

No.21 Bucket Wheel Dredger, State Electricity Commission of Victoria at Morwell Mine

#### 3.2 Why is it significant?

No.21 Dredger is historically significant as the first bucket wheel excavator to be used at the Morwell open cut. It was designed and built specifically for the SECV by LMG Germany, and it was the second bucket wheel excavator purchased by the SECV. The Morwell open cut was a new major open cut project developed by the SECV with work starting on site in 1949. No.21 dredger is associated with a period of significant expansion by the SECV to meet the exponential growth in demand for electricity during the post-war growth and industrial development of Victoria. No.21 dredger had a long period of service in the mine and worked between October 1955 and August 1992. It was used to excavate overburden and to supply brown coal to the Yallourn power station, and later to the Morwell power station and briquette factory, and Hazelwood power station.

No.21 Dredger is technically significant as an example of the earliest design of bucket wheel excavators used in the Latrobe Valley. It is representative of the first generation of German-built bucket wheel excavators used by the SECV, the design of which originated in German brown coal mines in the mid-1930's. It was the similar coal characteristics which saw the first German bucket chain excavators used at Yallourn from 1928, and later in 1950 the first bucket wheel excavator (No.3 dredger) in operation at Yallourn. In both cases these were some of the earliest uses of German continuous mining techniques and technology to be applied outside of Germany.

No.21 Dredger is technically significant as the only example of the pre-war design surviving in the Latrobe Valley. Ordered in 1950, this machine is largely based on pre-war excavator technology. It provides a direct comparison with later post-war bucket wheel excavator designs. This machine is fitted with a bucket wheel which features a crowding or thrusting movement where the bucket wheel can be moved relative to the slewing axis. This feature is largely associated with the pre-war or first stage of bucket wheel excavator development, and was no longer applied to new machines by the mid-1950's. By this time, post-war excavators had greatly increased in size, and were not fitted with the crowd feature, instead the bucket wheel to slewing axis length was fixed. This greatly simplified the design of the conveyors, transfer points, and deleted the requirements for an additional conveyor, sliding counterweights, and a thrust drive etc. The SECV were closely involved with the design of No.21 Dredger in conjunction with LMG to ensure suitability for local conditions. The dredger also embodies many local modifications made during its operational life including altering the buckets for improved excavation of Victorian brown coal.

As the only bucket wheel excavator with crowd surviving in the Latrobe Valley, No.21 Dredger is a rare surviving example of the earliest pre-war design of bucket wheel excavator used by the SECV for brown coal mining. It was the third of four bucket wheel

excavators with crowd (also referred to as Thrust) on the bucket wheel boom purchased by the SECV. The crowd function, which was a feature of bucket wheel excavators developed in the interwar period, necessitated a number of special adaptations including a travelling counterweight, a thrust drive and an intermediate conveyor between the boom conveyor and the discharge conveyor. Progression in the technology of continuous extraction of brown coal from open cut mines was marked first by bucket chain excavators, then by bucket wheel excavators with crowd and later by much larger bucket wheel excavators with fixed length bucket wheel booms. All bucket wheel excavators ordered by the SECV after 1960 had fixed length bucket wheel booms.

The dredger has very high interpretive potential, and its current location at the PowerWorks Visitors Centre allows close inspection and easy viewing access by visitors. It is the oldest surviving bucket wheel excavator in the Latrobe Valley, and the oldest in Australia.

### 3.3 Extent of Nomination

The whole of the bucket wheel excavator known as No.21 dredger, discharge conveyor, hopper, and length of associated conveyor on display.

### 3.4 Contextual History

The State Electricity Commission of Victoria (SECV) was established in 1921 to develop a centralised electricity supply in Victoria. The focus of its power generation activities was in the Latrobe Valley where there were extensive reserves of brown coal. Presently there are three main open cuts at Yallourn, Morwell, and Loy Yang. During the 1990's the SECV was split up and privatised. The Morwell open cut coal mine is currently operated by Engie Hazelwood.

#### Yallourn – Development & Excavators

When the SECV opened their first mine at Yallourn in 1921 to mine brown coal for the Yallourn power station, excavation was by large steam shovels for excavating both overburden and coal and loading to conveyors and rail trucks. Further electric and steam shovels were added as the mine expanded. By 1925 it was apparent these operations were not as cost effective as expected with the cost of coal at the power station bunkers being 70 per cent higher than originally estimated. In 1925, the SECV undertook a review of mining practices at open cuts in Germany. Germany had extensive brown coal deposits and were world leaders in continuous excavation of overburden and coal winning initially using bucket chain excavators, and later using bucket wheel excavators. The opinion of Herr Klitzing, a leading authority on German brown coal working, was sought on the operations at Yallourn. Herr Klitzing's recommendations were adopted with the installation of one overburden dredger, and two coal dredgers from Maschinenfabrik Buckau R. Wolf, Germany. The overburden bucket chain excavator commenced operations in February 1928, and the two rail-mounted bucket chain excavators commenced operations at Yallourn in 1929 and 1931 and loaded directly into trains (No.1 & No.2 dredgers).

The similarities between German and Latrobe Valley brown coal meant the techniques and technology developed in Germany for excavation and handling the coal were well suited to local application. The use by the SECV of bucket chain excavators from 1928, and later bucket wheel excavators from 1950 were in both instances amongst of the earliest applications of German continuous mining techniques and technology to be implemented outside of Germany.

### **New Mine at Morwell**

As the demand for electricity increased, the SECV worked on plans for the expansion of their power stations and corresponding coal mines. The SECV identified that it would be unwise to rely only on one coal mine, especially after the severe disruption to power supplies in November 1934 following the flooding of the Yallourn open cut, and that it was important another open cut mine be developed. The SECV appointed John Bridge as a consultant to examine the case for a new open cut. In 1946 the SECV accepted his recommendation that a new open cut be developed at Morwell, and this was accepted by the state government in 1948. Site work commenced in April 1949, however due to an economic recession work slowed and was restricted between 1951 and 1954 and plant purchases delayed. The first coal was excavated by No.21 dredger in 1955, and this was initially supplied to the Yallourn Power Station.

### **Numbering of Excavators by SECV**

It is important to note that the SECV did not follow consecutive number of dredgers as they were built. The initial dredger numbers used at Yallourn numbered 1 to 5, however the first dredger numbers allocated at Morwell started at number 19. Therefore No.21 dredger was not the twenty-first dredger built. Several dredger numbers were allocated for machines which were not built (dredgers No.17, 18, 22, 23, 26, and 28).

### **Excavator Orders – No.3 & No.4 Dredgers, 1946**

There was a considerable gap between the purchase of No.1 & No.2 dredgers, and when the next excavators were ordered. The first bucket wheel excavator to be purchased by the SECV was No.3 Dredger, which was ordered in 1946 from the LMG in Germany, and it started digging coal at Yallourn in November 1950 in conjunction with the two older bucket chain excavators (No.1 & No.2 Dredgers). No.3 dredger was a relatively small crawler mounted excavator and dug coal at the rate of 650 tons per hour. Also ordered in 1946 was No.4 dredger from the German firm Stahlbau Rheinhausen, and this was a rail mounted bucket chain excavator which started work in March 1951 on overburden removal at Yallourn.

No.3 Dredger is historically significant because it was the first bucket wheel excavator used in the Latrobe Valley at the Yallourn mine. Only the bucket wheel head was



preserved and is on display at PowerWorks. It does allow for an appreciation of the scale of No.3 Dredger and an overall context to be appreciated.



*Figure 3. No.3 Dredger Bucket Wheel Head*

#### **Excavator Orders – No.19 & No.20 Dredgers, 1947**

In 1947 the SECV ordered two rail mounted bucket chain excavators from the Sydney based company, Alluvial Mining Equipment Ltd. (AME). The first, No.19 dredger, was ordered in June, and the second, No.20 dredger, was ordered in October. The company was contracted to convert drawings of German excavators to Australian standards and manufacture them. No.20 dredger only underwent minor modification and went into service at the Morwell open cut in July 1956. No.19 dredger was originally intended for the Yallourn mine and due to substantial redesign it was delayed, and ultimately started work at the Morwell open cut instead in October 1960.

#### **Excavator Orders – No.21 Dredger & No.5 Dredger, 1949-50**

Negotiations commenced in September 1949 in Germany to purchase a bucket wheel excavator for the new Morwell open cut, and the offer of LMG was accepted in December 1949, and the order issued on 21 January 1950. This was the second bucket wheel excavator purchased by the SECV and was designated No.21 dredger.

Around the same time the SECV also purchased a small “off the shelf” bucket wheel excavator, which was designated No.5 dredger. This machine was purchased from Stahlbau Rheinhausen, Germany and was originally intended for Yallourn. It was found to be too small for the expanded plans for Yallourn, and was commissioned in 1953 at the Yallourn North open cut instead.

### **Summary of Excavator Operations at Morwell**

The first two excavators in the Morwell mine were No.20 and No.21 Dredgers. On 5 October 1955, No.21 Dredger was the first to work and commenced normal excavation of coal and loaded directly into the train hopper wagons. No.20 rail mounted bucket chain dredge commenced operation June 1956 removing overburden, and also loading directly into trains. No.3 Dredger, which commenced operations in 1950 at Yallourn, was transferred to Morwell in 1959, and returned to Yallourn in August 1982. In July 1960 after much delay No.19 dredger commenced operations on coal winning.



***Figure 4. No.21 Dredger in Morwell (later Hazelwood) Mine***

### **Later Excavators at Morwell Open Cut**

There was a gap of over ten years between the first group of orders for excavators for use at Morwell and Yallourn open cuts, and the next group of machines. The approval of the new 1200MW Hazelwood power station in 1959 as well as the continued supply to the Morwell power station and briquette operations meant more coal was required from the open cut and a new excavator was required. No.9 dredge was ordered from LMG in June 1960 and it commenced excavating in 1964. This was considered to be the first post-war design excavator purchased by the SECV and much experimentation with the design was undertaken. The third (No.10) and fourth (No.11) bucket wheel excavators, commenced operations in 1970. No.24 bucket wheel dredger commenced operations at Yallourn in 1984 and was transferred to Morwell in June 1987. The latest bucket wheel dredger to

commence operations at Morwell, was No.25 dredger which started operations in December 1989.

The present operations at Morwell comprise No.9, 10, 11, 24 and 25 dredgers. No.19 dredger operated from 1961 until being retired in 1989, No.20 dredger operated from 1956 until being retired in 1969, and No.21 dredger operated from 1955 until being retired in 1992.

### 3.5 History of Place

#### The Development of the Bucket Wheel Excavator

Following the loss of the First World War, Germany lost access to most of their black coal mines and had to develop their extensive brown coal reserves instead. The initial development of their brown coal mines used primarily bucket chain excavators. The bucket wheel excavator lagged behind in development and early examples built between 1916 and the mid-1920's were of limited success.

By the 1930's it was apparent a better way to win coal from seams interspersed with thin layers and inclusions of overburden was required. The bucket chain excavator was fundamentally unsuitable for such deposits whereas the bucket wheel excavator was ideally suited for selective digging. By the early 1930's the design of the bucket wheel excavator had improved greatly aided by the progress of electric motor technology which made it possible to install multiple independent drives.

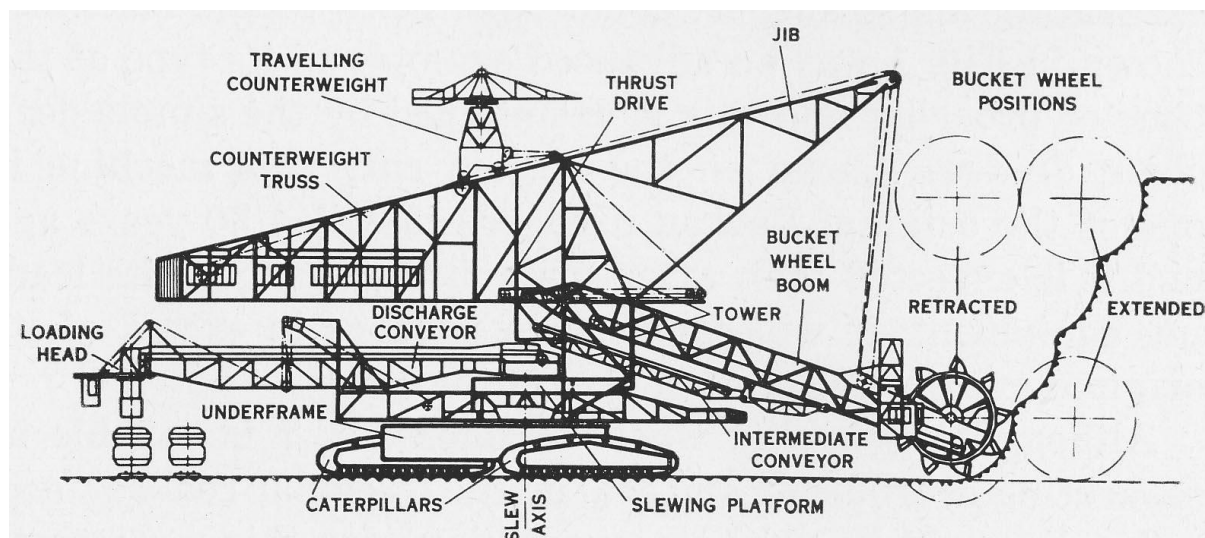
LMG produced their first bucket wheel excavator in 1934, which was mounted on three steerable crawlers and went into service at Bitterfeld, Germany. This machine had a service weight of 325 tons and was the prototype of bucket wheel excavator operations in surface mines. This machine was very mobile and embodied the characteristics required of equipment suited for high excavation capacity, and all subsequent developments have followed a similar layout.

Bucket wheel excavators fall into two fundamental categories based on how the bucket wheel is moved relative to the rest of the machine. This dictates the method of how the machine is used for excavation. This movement of the bucket wheel relative to the rest of the machine is referred to as crowd or thrust, and excavators are either built with crowd or without crowd.

A bucket wheel excavator with crowd allows a change in distance from the bucket wheel to the slewing axis over a certain distance without having to change the position of the machine. It was the most frequently built type of machine during the first stage of bucket wheel excavator development. Dredgers with crowd had the inner end of the bucket wheel boom mounted on a runway within the superstructure. This design was more complicated than bucket wheel excavators without crowd which had a fixed distance between the bucket wheel and the slewing axis. Non-crowd machines had to move horizontally more frequently to keep the bucket wheel in contact with the face of the excavation, however they had a simpler conveyor belt design which was a great benefit on larger machines, as



there were less transfer points. Bucket wheel excavators with crowd required an additional conveyor, a travelling counter weight, crowd drive etc, however they were more suitable for selective winning and lateral block working than non-crowd machines. Bucket wheel excavators with crowd were the predominant design built in the pre-war and early post-war period, and up until 1954 LMG had built at least 32 dredgers with crowd.



**Figure 5.** Names of major components of a bucket wheel excavator with crowd (thrust) (Rodgers, 1960, p.138)

In the post-war period the size of bucket wheel excavators increased greatly, driven by increasing overburden to coal ratios in German mines, and the need for greater machine efficiencies and reduced costs. The non-crowd bucket wheel excavator design became the dominant type by the mid-1950's due to its simplified design and reduced service weight, and the crowd design was no longer used.

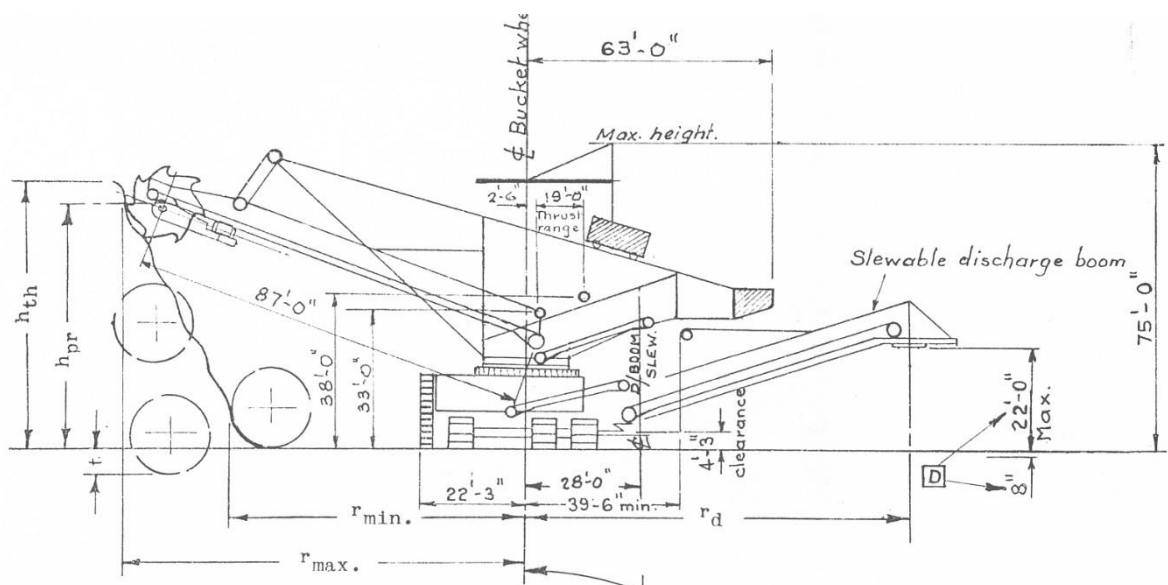
The use of bucket wheel excavators with crowd by the SECV was confined to only four of the sixteen bucket wheel excavators owned by the SECV. These were the earliest bucket wheel excavators used by the SECV and the succession of dredgers built reflected the overseas design progression in excavator design. Of the first five bucket wheel excavators purchased by the SECV, four of these had crowd.

No.3 dredger, ordered from LMG in 1946 and commissioned in November 1950 was the first bucket wheel excavator purchased by the SECV and was supplied with crowd. The second machine was No.5 dredger which was ordered from Stahlbau Rheinhausen in c.1949-50. This was a small "off the shelf" bucket wheel excavator which was supplied with no crowd. The second machine with crowd was No.21 dredger ordered from LMG in 1950. The only other two machines supplied with crowd were No.6 and No.7 dredgers ordered in 1951 from Stahlbau Rheinhausen. By the time No.9 dredger was ordered in 1960 from LMG it, and all subsequent excavators, were supplied with no crowd of the bucket wheel. No.9 dredger was also considered to be the first true post-war design bucket wheel excavator purchased by the SECV, and embodied much innovation and experimentation with its design.

### 3.6 No.21 Dredger – History

No.21 dredger was built by the German firm, Lubecker Maschinenbau Gesellschaft (LMG) at Lubeck, and was their serial number 1074. LMG had started manufacturing multi-bucket chain excavators in the 1880's and by the 1930's had extensive experience with bucket chain, and bucket wheel excavators in German brown coal mines. They were the first to build a crawler mounted bucket wheel excavator in 1934, establishing the principal layout for subsequent machines.

With the go ahead given in 1948 for the new Morwell open cut procurement of necessary plant commenced. Negotiations commenced in September 1949 in Germany to purchase a bucket wheel excavator, and the offer of LMG was accepted in December 1949, with the order issued on 21 January 1950. The dredger was manufactured in Germany. The dredger was originally intended to be in production by late 1952, however, delays in manufacture and shipping pushed back the commencement of site erection. Assembly was also slowed due to Commonwealth Government finance restrictions, and the dredger was finally able to travel off the erection site in November 1953, although it was not complete electrically. The dredger undertook some movement tests and trial digging tests before returning to the erection site on 25 November 1953. This was the first operation of a dredger at the Morwell Open Cut. Originally intended to dig coal, the dredger was used to dig overburden due to the delays to completion of No.19 and No.20 dredgers.



**Figure 6.** Schematic elevation drawing of No.21 dredger. (SECV plant data drawing)

The testing showed significant problems handling overburden and extensive redesign work was required. The Morwell project was placed on hold in November 1953, and only design work continued on the modifications. When the project recommenced in August 1954 completing No.21 dredger was given priority. In March 1955 the dredger again travelled off the erection site for testing. On 5 October 1955, No.21 dredger commenced normal overburden excavation and loaded directly into the train hopper wagons. Initially this dredger dug overburden and when encountered, coal until No.20 dredger started operations in July 1956. No.21 dredger was not well suited to overburden removal. In July 1958 No.21 dredger completed its original operational phase loading trains, and underwent conversion to make it suitable for loading conveyors. In November 1958, it was transferred



to the conveyor system ready for coal supply to the Morwell power station which was about to become operational.

In September 1962 a fall of coal from the coal face severely damaged the operator's cabin of No.21 dredger. The dredger was returned to operations after being repaired and was in regular use on coal excavation. In November 1971 the dredger underwent modification and modernisation. Other works were undertaken in the late 1980's and early 1990's to keep the dredger operational in the short term but with the expectation of its retirement. In 1992 a normal structural assessment found significant corrosion which compromised the operational integrity of the machine. The age, and low maintenance during the previous six years meant the dredger required a major refurbishment. In August 1992 the dredge was withdrawn from its standby role, and preparations made for its disposal.

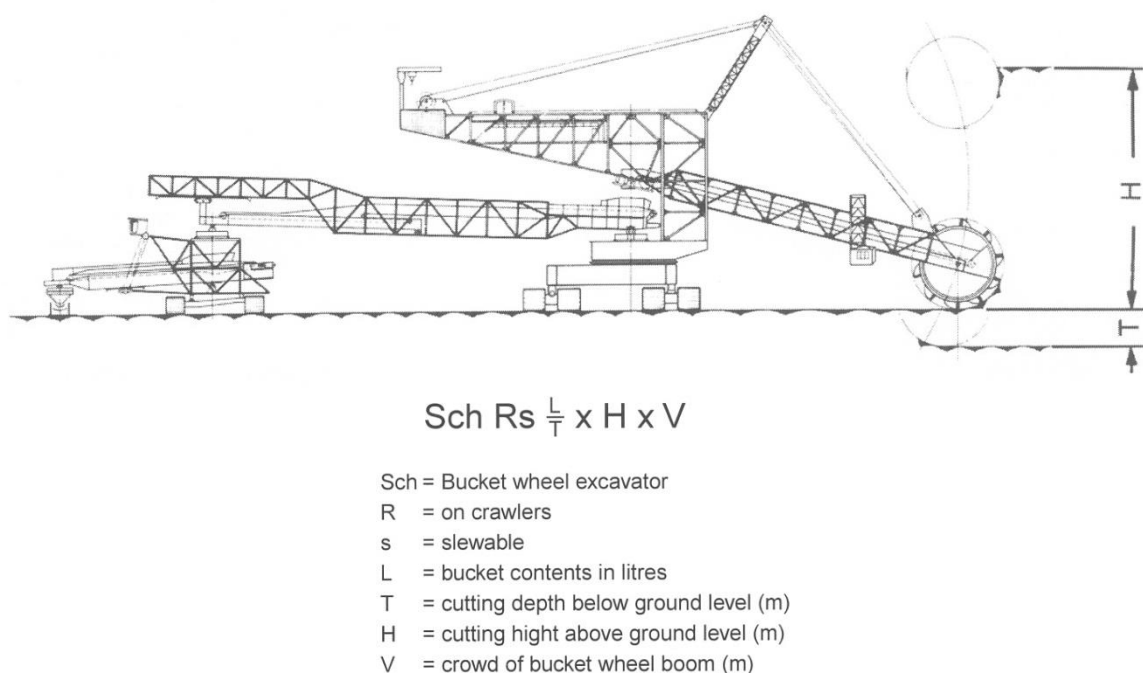
There was a strong local movement during the late 1980's to establish a regional heritage centre and have a range of mining machinery on display in the valley. A precinct was established at The Ridge and the PowerWorks visitor centre opened. No.21 dredger with support from local industry was driven out of the mine and placed on display in 1995.

### 3.7 No.21 Dredger – Specification

No. 21 dredger is a crawler mounted bucket wheel excavator. It was fitted with a slewable superstructure, and a bucket wheel with crowd (thrust), steerable crawlers, and a slewable discharge belt conveyor boom. It is powered by electricity.

The complete technical description of this excavator is: Sch Rs  $\frac{400}{1.8} \times 18 \times 6$

The definition is shown in figure 7.

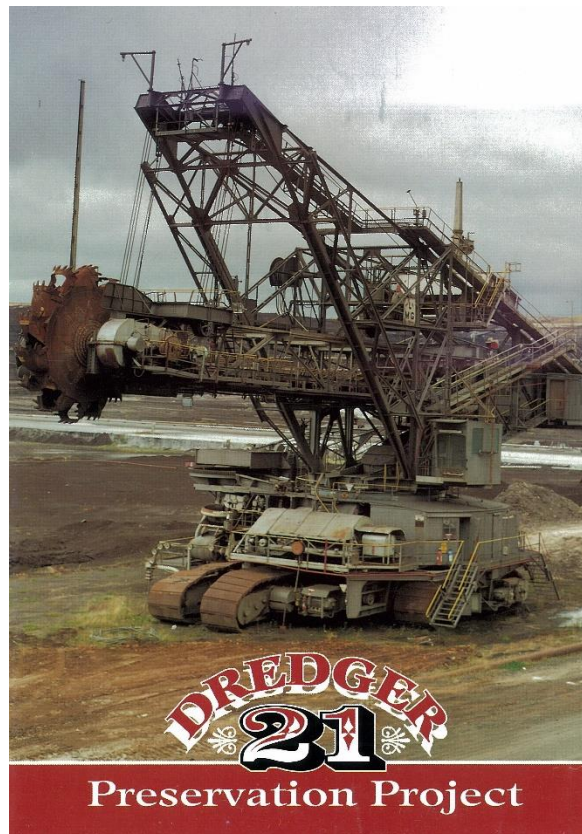


**Figure 7.** Typical Bucket Wheel Excavator terminology (Note: Illustration is not No.21 dredger).

### 3.8 Machine Intactness

No.21 Dredger is in fair condition and suitable for static display. All the major elements of the machine are still present, and the display even includes a hopper which the dredger discharged into and a length of conveyor to show how the coal was moved to the power station. Some small parts have been removed for use as spare parts in other machines. The machine is in need of remedial structural repairs, and painting to address corrosion of the steel structure. The dredger is on static display near the PowerWorks visitors centre in Morwell in a fenced area.

Dredger 21 was gifted to Gippsland International in April 2010, and in August 2010 it was listed on the heritage register. It is now managed by the “Friends of Dredger 21”, a volunteer group from within Gippsland International.



### 3.9 Comparison with other Equipment

The only place in Victoria where bucket wheel excavators are used is in the Latrobe Valley and all are associated with either excavating brown coal, or removing overburden. This region has the largest concentration of bucket wheel excavators in Australia. There has been very limited use of bucket wheel excavators elsewhere in Australia, and these have generally been single smaller machines used in mining. Table one summarised the bucket wheel excavators presently in the Latrobe Valley.

**Table 1.** Table of Bucket Wheel Excavators currently in the Latrobe Valley Brown Coal Mines

Dredger No.	Manufacturer	Date Commissioned*	Output (m <sup>3</sup> /hr)	Service Weight (tons)
<b>Loy Yang Mine</b>				
14	Krupp	1982	10,560	4,202
15	Krupp	1984	10,560	4,202
16	Demag	1988	8,300	5,000
27	Krupp	1992	5,040	1,009
<b>Hazelwood (Morwell) Mine</b>				
9	LMG	1964	3,660	1,540
10	Export Union (Krupp & LMG combined)	1970	4,550	1,791
11	Buckau R.Wolf	1970	4,550	1,650
24	O&K	1984	3,100	450
25	O&K	1989	5,680	1,000
<b>Yallourn Mine</b>				
12	Backau R. Wolf	1974	5,650	1,641
13	Krupp	c.1977	5,184	1,950
<b>Powerworks (static display)</b>				
21	LMG	1955	1,260	725

Notes about the table:

- The numbering of Dredgers by the SECV was not in consecutive order of construction. Often numbers were allocated for planned dredgers which did not go ahead, due to changes in plans for the open cuts, so these numbers remained unused.
- The date commissioned is a guide as to when the machine commenced operation. Often there was a period of up to five years beforehand of design and construction.
- The output has been shown as cubic meters per hour for comparative purposes. This varied in practice depending on whether overburden or coal were being excavated.

There are components of two other SECV coal dredgers in preservation. The bucket wheel head from No.3 dredger is on display at PowerWorks. The Driver's Cabin of No.8 bucket ladder dredge is on display at the Brown Coal Mine Museum, Yallourn.

Models of No 8 Dredger (ex Yallourn Mine) and No 15 Dredger (current Loy Yang Mine) is on exhibition at the PowerWorks Museum in Morwell.

There are no other examples of bucket wheel excavators preserved in Australia, and on a worldwide basis there seem to be very few bucket wheel excavators deliberately preserved. There are thought to be several machines built in the 1950's parked up at mines in Germany. No.21 Dredger is one of the smallest excavators in both weight and output in the Latrobe Valley. No.24 dredger is smaller in weight, but has a much higher output. It is also

a modern compact bucket wheel excavator design. No.21 Dredger is from the period of the first generation of bucket wheel excavators used in the brown coal mines of the Latrobe Valley. It was the first dredger to commence operation at the Morwell project. It is the oldest excavator left in the Latrobe Valley, and it is one of the oldest surviving machines of this type in the world.



## 4 HERITAGE LISTING & ASSESSMENT

Extracts from letter from Heritage Victoria, dated 9 August 2010, advising of the registration of No.21 Dredger on the Victorian Heritage Register.

**VICTORIAN HERITAGE REGISTER NUMBER: H2130 NAME:NO 21**

**DREDGER**

**LOCATION: RIDGE ROAD MORWELL, LATROBE CITY LOCAL**

**GOVERNMENT AREA: LATROBE CITY**

**CATEGORY: Heritage object/s DATE**

**REGISTERED:**

**FILE NO: PL-HE/06/0045; 09/005577-01 (HC File Only)**

**EXTENT:** The Object being the No.21 Dredger and associated hopper and length of conveyor located at the Power Works Visitor Centre site, Ridge Road Morwell.

### STATEMENT OF CULTURAL HERITAGE SIGNIFICANCE:

#### What is significant?

No.21 Dredger was ordered by the State Electricity Commission of Victoria (SECV) in 1950 and commenced operation in the Morwell open cut in October 1955. The opening of the Morwell open cut in 1949 marked the beginning of the significant expansion of the activities of the SEC during the post-war growth and industrial expansion of Victoria.

No.21 Dredger was the third of four bucket wheel excavators with crowd on the bucket wheel boom purchased by the SECV. The crowd function, which was a feature of bucket wheel excavators developed in the interwar period, necessitated a number of special adaptations including a travelling counterweight, a thrust drive and an intermediate conveyor between the boom conveyor and the discharge conveyor. Progression in the technology of continuous extraction of brown coal from open cut mines was marked first by bucket chain excavators, then by bucket wheel excavators with crowd and later by much larger bucket wheel excavators with fixed length bucket wheel booms. All bucket wheel excavators ordered by the SECV after 1960 had fixed length bucket wheel booms.

No.21 Dredger was built by Lubecker Maschinenbau Gesellschaft (LMG), of Lubeck, West Germany. It is mounted on crawlers and fitted with a slewable superstructure. It has a service weight of 725 tons. It was used for excavating overburden and brown coal from the

Morwell open cut mine until August 1992 when it was retired. It was placed on display at the Powerworks Visitor Centre from 1995.

**How is it significant?**

No.21 Dredger is of historical and scientific (technological) significance to the State of Victoria.

**Why is it significant?**

No.21 Dredger is of historical significance as the first bucket wheel excavator to be used in the Morwell open cut mine.

No.21 Dredger is historically significant for its rarity as the oldest surviving bucket wheel excavator of those purchased by the SECV in the post-war period. It is also significant for its rarity as the only surviving bucket wheel excavator from the first generation with crowd mechanism.

As the only surviving bucket wheel dredge with crowd (thrust) in Victoria, No.21 Dredger is of scientific (technological) significance for its potential to yield information about the design of the first generation of bucket wheel excavators.

No.21 Dredger is of scientific (technological) significance for its capacity to represent the successful adaptation to the Victorian brown coal fields of continuous extraction technologies developed for German open cut brown coal mines.

## 5 INTERPRETATION PLAN

It is intended to conduct the heritage recognition ceremony for No.21 Dredger as a part of the Engineers Country Weekend to be held in Traralgon from 7 to 10 October 2016. The actual ceremony will be held on Sunday 9 October 2016 at the PowerWorks site at “The Ridge”, Morwell where the No.21 Dredger is located.

The proposed interpretation will consist of two interpretation panels measuring 1000 w x 700 h mounted on existing steel frames at an angle to the horizontal plane. These panels will replace existing superseded panels on the same frames. Panel design is being carried out in parallel with the writing of this nomination and will be submitted to the HRC as soon as possible.

The site does not have a suitable location for the 300 mm diameter round EHM marker due to the design of the steel structures. The representation of the marker on at least one of the panels will be enlarged to provide a significant representation of the marker.

The location of the panels is on a viewing platform overlooking the dredge. A curved concrete wall with concrete paved viewing area is fitted with frames for 4 interpretation panel frames to support panels of the same size. Two of these will be used to recognise the No.21 Dredger and the others will be replaced to interpret other aspects of the PowerWorks site and the nearby Morwell Open Cut Mine in due course. This is an excellent mounting position for the panels.

## APPENDIX A: REFERENCES

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Vines, J. A., 2008, *Coal Mining Heritage Study in Victoria*, Heritage Council of Victoria.

Wislicki, A., 1994, *History of Excavators and Dredges*, ATM, France.

Citation

## APPENDIX B: HERITAGE AWARD NOMINATION LETTER

The Heritage Advisor  
Engineering Heritage Australia  
Engineers Australia  
Engineering House  
11 National Circuit  
BARTON ACT 2600

### **Name of work: No.21 Dredger, Morwell**

**This work is nominated for an Engineering Heritage Marker award under the Engineering Heritage Recognition Program of Engineers Australia.**

#### **Location, including address:**

Powerworks, "The Ridge" Ridge Road, off Commercial Road (C475), Morwell, Victoria

#### **Grid reference:**

Latitude: 38.2431 south, Longitude: 146.412726 east

#### **Owner:**

"Friends of Dredger 21", a volunteer group from within Gippsland International, address as above.

#### **Owners Agreement:**

The owner has been advised of this nomination and a letter of agreement is attached at Appendix C.

#### **Access to site:**

There is no limitation to public access however the dredger itself is fenced off for safety reasons.

#### **Nominating Body:**

Friends of Dredger 21.

**Ian Newnham**

**Secretary of Friends of Dredger 21.**

**Date: 25 September 2016**

**David LeLievre**

**Chair**

**Engineering Heritage Victoria**

**Date: 25 September 2016**



## APPENDIX C: OWNERS LETTER OF AGREEMENT

Copy of email from Ian Newnham dated 22 September 2016 at 10:29 PM:

**To: Engineering Heritage Australia**

**Attention: Mr Owen Peake**

**Gippsland International Incorporated, representing Friends of 21 Dredger, are pleased to accept formal recognition of Dredger 21 by Engineering Heritage, Australia, and installation of appropriate interpretation panels at the Dredger 21 overview point, Ridge Road, Morwell.**

**Yours Faithfully**

**Ian Newnham  
Secretary  
Gippsland International Incorporated**